ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

Douglas A. Ducey
Governor

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via e-mail

March 16, 2020
FPU20-218

Ms. Catherine Jerrard
AFCEC/CIBW
706 Hangar Road
Rome, NY 13441

RE: WAFB – ADEQ Comments – *Draft, Soil Vapor Extraction System And EBR Pilot Study, 2018 First and Second Quarter Performance Report, Former Liquid Fuels Storage Area, Site ST012, Former Williams Air Force Base, Mesa, Arizona;* prepared for Air Force Civil Engineer Center [AFCEC/CIBW], Lackland AFB, TX; prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec), Phoenix, AZ; document dated November 29, 2019.

Dear Ms. Jerrard:

Arizona Department of Environmental Quality (ADEQ) Federal Projects Unit (FPU) and ADEQ contractor UXO Pro, Inc. reviewed the above referenced document. ADEQ's comments are provided below.

General Comments

1. ADEQ appreciates the information breadth and depth presented within the 2018 first and second quarter performance report. ADEQ understands that the November 2019-dated draft document recounts generally 2018 calendar year activities. ADEQ notes this draft-version report was released over 16 months after the reporting period ended. The ability to comprehend actions and relate concerns is hindered by reports released over a year after the action reporting period. Regulatory concurrence may be limited due to the inability to receive timely clarification and implement actions.
2. ADEQ suggests the document include text discussing evaluations and investigations regarding contaminant vapor intrusion into nearby buildings.
3. ADEQ believes elaboration and greater discussion will benefit the data presentation in Sections 3.1.2, 3.1.3, and 3.1.4.

Specific Comments:

1. Bound cover. Please clarify the report preparer. The bound copy cover lists the preparer as *Amec Environment & Infrastructure, Inc.* However, the inside title page lists the preparer as *Amec Foster Wheeler Environment & Infrastructure, Inc.*
2. *Table of Contents*, Page i, *List of Figures*. Why is Figure 1-1 not listed?
3. *Table of Contents*, Page i, Line 62 AND Section 3.1.5 *Groundwater Extraction and Treatment activities* [sic], Page 3-7, Line 1010. Verify capitalization consistent with writing style guide ...[a]ctivities…
4. *Table of Contents*, *List of Figures*, Page iii, Lines 114-116. Verify figures are available in electronic format. Figures 3-1 through 3-3 (pdf-format) are not readable in the draft report's electronic version. Please ensure the figures can be accessed and readable in all formats in subsequent versions.
5. Section 1.3.1 *SVE Remedy*, Page 1-3, Lines 239-241. Please revise the sentence to read, "OU-2 RODA 1 established soil cleanup levels for chemicals of concern including 5 milligrams per kilogram (mg/kg) for benzene and 2,000 mg/kg for total petroleum hydrocarbons (TPH)."
6. Section 1.3.1 *SVE Remedy*, Page 1-3, Line 246. Please edit the sentence to read, "removed *approximately* 344,000 gallons of fuel contamination."
7. Section 1.3.1 *SVE Remedy*, Page 1-3, Line 252. Please identify the four nested vapor monitoring points that were abandoned in 2013. Will these monitoring points be replaced to provide data for evaluating the performance of the SVE system?
8. Section 1.3.1 *SVE Remedy*, Page 1-4, Line 229. Please add text summarizing efforts assessing contaminant vapor intrusion into buildings on or near the site.
9. Section 1.3.2 *SEE and EBR Remedy*, Page 1-4, Line 289. Please replace "the USEPA" with "EPA."
10. Section 1.3.2 *SEE and EBR Remedy*, Page 1-4, Line 292. Please replace "the USEPA" with "EPA."
11. Section 1.3.2 *SEE and EBR Remedy*, Page 1-5, Line 295. Please edit to read … "construction, completion, and extraction startup in the second quarter of 2018, but *sulfate* injection …"
12. Section 1.5 *Report Objectives*, Page 1-7, Line 318. Please edit to read "… OM&M report with respect to the *EBR* pilot study *and other site activities for* …"
13. Section 2.1.1 *General SVE System Operation*, Page 2-1, Line 333. Please provide *Figure 2-1 SVE Well Locations*.
14. Section 2.1.1 *General SVE System Operation*, Page 2-1, Lines 352-354. Please edit the sentence that starts on Line 352 and ends on Line 354. The references to switching over and remaining, treating air stripper off-gas, and the time periods are confusing.
15. Section 2.1.2 *SVE System Monitoring*, Page 2-5, Line 413. Please edit "were monitored" to read "was monitored."
16. Section 2.2.1.1 *SVE Vapor Sample Analysis*, Table 2-7 *Summary of SVE Gas Measurement's*, Pages 2-13 thru 2-15. Please verify that measurements are correctly reported. Nine of the individual extraction well screens were noted to be closed throughout the reporting period and all these screens are reported as having measured oxygen contents of zero. In addition, all nine of these screens are reported as having average measured VOC concentrations (FID) of zero in the second quarter. Please verify that these measurements are correctly reported.
17. Section 2.2.2 *SVE Fixed Laboratory*, Page 2-18, Line 694. The text states that vapor samples were not collected from the well field manifold for laboratory analyses after 03 May 2018 because the stream was equivalent to the flame oxidizer influent; however, the flame oxidizer influent is diluted. Why was the undiluted well field manifold not sampled instead to provide a higher detection limit and increased analytical accuracy (i.e., no dependence on measures of dilution flow to determine well field concentrations)?

18. Section 2.2.2 *SVE Fixed Laboratory*, Table 2-8 *Fixed Laboratory Analytical Results*, Pages 2-19 thru 2-22. The table presents a calculated average analyte mass as a percentage of total influent ThermOx. This calculation should be provided separately for measurements before 03 May 2018 and those after this date to distinguish between well field vapors and air stripper off-gas.
19. Section 2.3.1 *Mass Removal and Destruction Efficiency*, Page 2-23, Line 749. Please revise the incomplete sentence. Should "*and the*" be deleted?
20. Section 2.3.1 *Mass Removal and Destruction Efficiency*, Page 2-24, Line 762. The text states the change in extraction configuration did not significantly affect mass removal rates between quarters but does not describe what the changes were. What changes were made in the extraction configuration?
21. Section 2.3.1 *Mass Removal and Destruction Efficiency*, Page 2-25, Line 795-797. The text states that prior to SEE, CH4 concentrations in the vapor collected by SVE were much lower and that the collection of CH4 by SVE appears related to SEE suggests and that the CH4 is likely generated in the saturated zones. Please edit the text as follows to describe an additional possible source of methane, "Given that prior to SEE CH4 concentrations in the vapor collected by SVE were much lower, the collection of CH4 by the SVE appears related to SEE and suggests that the CH4 was likely generated in the saturated zones below the SVE system or in deep vadose zone soils heated by upward thermal conduction from the steam zone."
22. Section 2.3.1 *Mass Removal and Destruction Efficiency*, Page 2-25, Line 795-797. What were the causes for the inflection at the start of May 2016 toward an increase in methane recovery? Can this be attributed to the re-connection of deep SVE well screens?
23. Section 2.3.1 *Mass Removal and Destruction Efficiency*, Graph 2-2 *Equivalent JP-4 Degradation Based on Methane Removed*, Page 2-26. Please verify dates and SEE start & stop indicators. The demarcations for the SEE start and stop do not appear to be correctly positioned.
24. Section 2.3.2 *Notable Trends*, Page 2-27, Lines 817-819. The text states TPH concentrations at ST012-SVE05D, ST012-SVE06D, and ST012-SVE07M began increasing in August/September 2011 to levels consistent with startup concentrations at these locations. What are possible explanations for this observation? Did the water table rise to the bottom of these screens by 2011?
25. Section 2.3.2 *Notable Trends*, Page 2-27, Line 839. The text states the TPH measurement in April 2005 was made at the thermal oxidizer influent, is this correct? Or was the measure from the flame oxidizer influent?
26. Section 2.3.2 *Notable Trends*, Page 2-27, Lines 838-839. The text states the TPH influent concentration was decreased in December 2016 from April 2005. Were similar wells connected to the SVE system at these two times to make the comparison relevant? Should the text read, "… December 2016 after the cessation of *SEE and more than six months after re-connecting and extraction from the deep SVE wells*"?
27. Section 2.3.2 *Notable Trends*, Page 2-27, Line 842. Please correct the spelling of concentration.
28. Section 2.3.2 *Notable Trends*, Page 2-27, Line 844. Please edit to read, "… from *the* flame oxidizer."
29. Section 2.3.2 *Notable Trends*, Page 2-27, Lines 844-846. The text states the average wellfield influent concentration decreased from the Q4 2017 average of 846 ppmv to 542 ppmv during the reporting period; however, the wellfield concentration was not sampled after 04 May 2018. Did the cited period average of 542 ppmv include vapor samples from the flame oxidizer influent that were diluted?
30. Section 2.3.2 *Notable Trends*, Page 2-28, Lines 863-862. The text states deep SVE well concentration were higher after SEE but overall TPH concentrations were lower; should this refer to a lower influent TPH concentration rather than overall concentrations? Was the lower influent TPH concentration also attributable to relatively low extraction rates from the deep screens as compared to the middle screens?
31. Section 2.3.2 *Notable Trends*, Page 2-28, Lines 863-864. The text refers to average total TPH mass removed per quarter, but the quarterly value is a single calculated value, please clarify.

32. Section 2.3.2 *Notable Trends*, Page 2-28, Line 866. Please re-phrase the expression, "likely due to overall TPH influent concentrations decrease in SVE wells."
33. Section 2.3.2 *Notable Trends*, Page 2-28, Lines 870-871. The text cites an average benzene concentration in the oxidizer influent of 1.3 ppm and associated benzene content of 0.07% in the total mass; do these values include measurements made in the air stripper off-gas? If so, using concentrations in vapors sampled from the wellfield manifold is more appropriate for comparison with April 2005 values.
34. Section 2.3.2 *Notable Trends*, Page 2-28, Lines 871-873. See the comment above regarding comparisons of benzene content with previous periods.
35. Section 2.3.2 *Notable Trends*, Page 2-28, Line 877. The text states oxygen concentrations were only slightly depleted compared to ambient in the influent to the oxidizer; however, were the measured samples diluted with ambient air?
36. Section 2.3.2 *Notable Trends*, Page 2-28, Line 883. Should the sentence refer to increases in CO2 rather than CO?
37. Section 2.3.2 *Notable Trends*, Page 2-28, Line 888. Please provide some discussion on the estimated magnitude of aerobic degradation occurring based on oxygen depletion and carbon dioxide production. For example, using field measures at the wellfield influent for flow rate, oxygen content, and carbon dioxide content (provided in Appendix B), the rate of hydrocarbon degradation averaged 580 pounds per day based on oxygen depletion and 200 pounds per day based on carbon dioxide production. Using these rates, the estimate volume of fuel hydrocarbons degraded by aerobic processes in the reported 6-month period ranges from 3,600 to 10,000 gallon-equivalents.
38. Section 2.3.3 *SVE Optimization Summary*, Page 2-28, Line 892. Please change "or" to "and."
39. Section 2.3.3 *SVE Optimization Summary*, Graph 2-3 *Estimated Mass Removal by Well (TPH as JP-4)*, Page 2-29. Please add wells SVE09M, 10, and 11to the graph, as these wells were open to extraction during the reporting period.
40. Section 3.1.1 *Pilot Study Remedy Construction*, Page 3-1, Line 949. Please correct the spelling of concrete.
41. Section 3.1.1 *Pilot Study Remedy Construction*, Page 3-2, Line 956. Please change "are" to "is".
42. Section 3.1.1 *Pilot Study Remedy Construction*, Page 3-2, Line 961. Please change "consisting" to "consists".
43. Section 3.1.2 *Site Groundwater Sampling*, Page 3-2, Line 984. Please delete "In addition, due to" for clarity.
44. Section 3.1.2 *Site Groundwater Sampling*, Page 3-2, Line 988. Please add a general discussion of the analytical results presented in Table 3-1. An example statement could be, "18 wells were sampled in the CZ and analyses yielded 4 locations equal to or below MCL for benzene and 6 locations exceeding 500 ug/L of benzene." Similar discussion could be added for the UWBZ, LSZ, and other compounds of concern.
45. Section 3.1.2 *Site Groundwater Sampling*. Page 3-4, Please provide a title for Table 3-1.
46. Section 3.1.3 *Site LNAPL Sampling*, Page 3-3, Line 998. Please add a general discussion of the analytical results presented in Table 3-2.
47. Section 3.1.3 *Site LNAPL Sampling*. Page 3-6, Please provide a title for Table 3-2.
48. Section 3.1.3 *Site LNAPL Sampling*, Page 3-4, Table 3-2. Please add a heading to each page of the analytical results table identifying it as Table 3-2.
49. Section 3.1.5 *Groundwater Extraction and Treatment activities* [sic], Page 3-8, Table 3-5. Please add "Table 3-5" to the heading on each page of the table.

50. Section 3.0 (Section 3.1 *Activities Performed* AND Section 3.2 *Waste Disposal* AND Section 3.3 *Site Evaluation.*). Please correct the following inconsistencies and clarify waste disposal activities conducted during the reporting period.
- Section 3.1.7 *Site Temperature Monitoring*, Page 3-15, lines 1082-1083. Text states that ten of the eleven temperature monitoring points had temperatures above the maximum value of 150° F approved for disposal in the City of Mesa sewer.
- Section 3.2 *Waste Disposal.* Text reports no waste disposal activities occurred during the reporting period.
- Section 3.3.4.1 *Wastewater Discharge Permit Compliance.* Text indicates wastewater was discharged to the City of Mesa according to the approved permit.
- Section 3.3.4.1 *Wastewater Discharge Permit Compliance.* Text further states that the maximum discharge temperature was not exceeded.

51. Section 3.1.3 *Site LNAPL Sampling*, Page 3-3, Line 998. Please add a general discussion of the biological sampling results presented in Appendix L. How do the results relate to the EPR Pilot Study?
52. Section 3.1.5 *Groundwater Extraction and Treatment activities* [sic], Page 3-7. The text in this section states the groundwater extraction and treatment was initiated on 04 May 2018; however, the table on page 3-8 indicates sampling occurred on 02 May 2018. Which date is correct or what is the purpose of the sampling on 02 May 2018?
53. Section 3.1.5 *Groundwater Extraction and Treatment activities* [sic], Page 3-7, Line 1035. The text refers to Table 3-5, should the table provided on pages 3-8 to 3-10 be referred to as Table 3-3 and have a corresponding label?
54. Section 3.3.2 *Mass Removal by Groundwater Extraction*, Page 3-23, Line 1206. How was TPH mass removed calculated? The table provided on page 3-8 indicates the air stripper influent sample was not analyzed for TPH.
55. Section 3.3.2 *Mass Removal by Groundwater Extraction*, Page 3-23, Line 1206. Section 2.1.1 states that the thermal oxidizer was dedicated to treating the air stripper off-gas from 04 May 2018 through the remainder of the period. Air flow and VOC concentrations are available for the thermal oxidizer influent providing independent data for calculating the mass of benzene and TPH removed from the air stripper influent water. Are these two independent measurements of mass consistent? Estimates of the masses exiting the air stripper based on thermal oxidizer influent sampling is provided below. The benzene mass estimate is significantly higher than 11.8 pounds cited on Line 1206, what are the causes of these discrepancies?

Groundwater Mass Extracted based on ThermOx Treatment of Air Stripper Off-Ga

DATE	Air Flow	Benzene	Benzene	Benzene	TPH	TPH	TPH
5/4/2018	scfm	ppm	lb/day	cum. lbs	ppm	lb/day	cum. lbs
5/10/2018	1,098.60						
5/17/2018	988.7	7.6	2	31	90	38	493
5/24/2018	927.4						
5/31/2018	921.8	14	4		120	47	
6/1/2018				79			1,131

56. Appendix B *SVE Field Monitoring Results*. Gas flow measurements are reported for "Now Air Stripper Influent." Should this be air stripper effluent?
57. Appendix B *SVE Field Monitoring Results*. Measurements for "Thermal Oxidizer – Influent" are reported for the period 04/07/2016 through 9/29/2016 and do not include the current reporting period. Please add these data.

58. Appendix B *SVE Field Monitoring Results*. Measurements for "Thermal Oxidizer – Effluent" are reported for the period 04/07/2016 through 03/16/2017 and do not include the current reporting period. Please add these data.
59. Appendix B *SVE Field Monitoring Results*. Field measurements for all the individual extraction screens SVE-01 Shallow through SVE-14 are incomplete and do not include measures for the current reporting period. Please add these data.
60. Figure E-3 *SVE01 Middle*. The inset graph has the same x-axis range as the larger graph; please reduce the date range on the inset graph for clarity.
61. Figure E-4 *SVE01 Deep*. The inset graph should be deleted because the y-axis range is nearly the same as the larger graph.
62. Figure E-7 *SVE02 Deep*. The inset graph does not appear to provide the same data as the larger graph, or the y-axis range eliminates data. Please check or simply delete the inset graph.
63. Appendix M *Pilot Study Field Log Data and Extraction Volume Estimates*. All the individual Wellhead Field Logsheets have a Well ID of ST012-CZ07, this appears to be an error requiring correction.

Closure

ADEQ may add or amend comments, evaluations, and concurrence if evidence to the contrary of our understanding is discovered; if received information is determined to be inaccurate; if any condition was unknown to ADEQ at the time this document was delivered; if other parties bring valid concerns to our attention; or site conditions are deemed not protective of human health and the environment within the scope of this Department.

Thank you for the opportunity to comment. Should you have any questions regarding this correspondence, please contact me by phone at (602) 771-4121 or e-mail miller.wayne@azdeq.gov.

Sincerely,

Wayne Miller
ADEQ Project Manager, Federal Projects Unit
Remedial Projects Section, Waste Programs Division

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